This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (canceled)

1   Claim 2 (currently amended): The method of claim 11 ~~1~~
2   wherein the path is a label-switched path.

1   Claim 3 (currently amended): The method of claim 11 ~~1~~
2   wherein the message is a resource reservation protocol PATH
3   message.

1   Claim 4 (currently amended): A method for processing, by a
2   node of a network, a message carrying at least one network
3   path determination constraint, the method comprising:
4   a) performing a constraint-based path determination
5   to a next node selected from a group of nodes
6   consisting of
7   (i) an area border node,
8   (ii) an autonomous system gateway node,
9   (iii) a node that can process one of the at least
10   one network path determination constraint carried
11   by the message which the present node cannot, or
12   will not, evaluate,
13   (iv) a specified loose-hop node, and
14   (v) a node to which constraint processing is
15   delegated,
16   to generate a partial path; and
17   b) forwarding the message carrying the at least one
18   network path determination constraint to an adjacent
19   downstream node on the partial path, or to a delegated
20   node that is able to carry out the path determination,

3

21 ~~The method of claim 1~~ wherein the at least one network path

22 determination constraint includes at least two constraints

23 selected from a group of constraints consisting of:

24   - link type

25   - minimum link bandwidth,

26   - minimum reservable link bandwidth,

27   - maximum current bandwidth reservation,

28   - maximum current bandwidth usage,

29   - link coloring,

30   - link administrative group,

31   - link delay,

32   - link media type,

33   - end-to-end path minimum bandwidth,

34   - end-to-end path maximum number of hops,

35   - end-to-end path minimum priority,

36   - optical link wavelength,

37   - optical link minimum signal to noise ratio,

38   - optical link maximum power dispersion,

39   - optical link transmission power,

40   - optical link receiver sensitivity,

41   - node type,

42   - minimum node throughput,

43   - node quality of service support, and

44   - node queuing type.

1   Claim 5 (currently amended): A method for processing, by a

2   node of a network, a message carrying at least one network

3   path determination constraint, the method comprising:

4   a) performing a constraint-based path determination

5   to a next node to generate a partial path; and

4

6   b)   forwarding the message carrying the at least one

7   network path determination constraint to an adjacent

8   downstream node on the partial path,

9   wherein each of the at least one network path

10 determination constraint is an executable instruction.

1   Claim 6 (currently amended): A network node comprising:

2   a) a path determination facility for performing a

3   constraint-based path determination to a next node to

4   generate a partial path; and

5   b) a signaling facility for

6   i) receiving a message carrying at least one

7   network path determination constraint, and

8   ii) forwarding the message carrying the at least

9   one network path determination constraint to an

10   adjacent downstream node on the partial path,

11   wherein each of the at least one network path

12 determination constraint is an executable instruction.

1   Claim 7 (original): A method for processing, by a node of

2   a network, a message carrying at least one network path

3   determination constraint, the method comprising:

4   a) performing a constraint-based path determination

5   to a next node selected from a group of nodes

6   consisting of

7   (i) an area border node,

8   (ii) an autonomous system gateway node,

9   (iii) a node that can process one of the at least

10   one network path determination constraint carried

11   by the message which the present node cannot, or

12   will not, evaluate,

13   (iv) a specified loose-hop node, and

14   (v)   a node to which constraint processing is

15   delegated,

16   to generate a partial path; and

17   b)   forwarding the message carrying the at least one

18   network path determination constraint to an adjacent

19   downstream node on the partial path, or to a delegated

20   node that is able to carry out the path determination,

21   ~~The method of claim 1~~ wherein the at least one network path

22   determination constraint includes at least one constraint

23   selected from a group of constraints consisting of:

24   - node type,

25   - minimum node throughput,

26   - node quality of service support, and

27   - node queuing type.

1   Claim 8 (currently amended):   The method of claim 11 ~~1~~

2   wherein the at least one network path determination

3   constraint includes a list of at least one explicit node

4   specified to be a part of the path.

1   Claim 9 (original):   The method of claim 8 wherein the list

2   of at least one explicit node specified to be a part of the

3   path identifies at least one of a strict-hop node and a

4   loose-hop node.

1   Claim 10 (original):   The method of claim 8 wherein the

2   message forwarded to the adjacent downstream node on the

3   partial path includes an updated list, and

4   wherein the node maintains the initial instance

5   of the list, as received.

1 Claim 11 (currently amended): A method for processing, by

2 a node of a network, a message carrying at least one

3 network path determination constraint, the method

4 comprising:

5   a) performing a constraint-based path determination

6   to a next node selected from a group of nodes

7   consisting of

8   (i) an area border node,

9   (ii) an autonomous system gateway node,

10   (iii) a node that can process one of the at least

11   one network path determination constraint carried

12   by the message which the present node cannot, or

13   will not, evaluate,

14   (iv) a specified loose-hop node, and

15   (v) a node to which constraint processing is

16   delegated,

17   to generate a partial path; and

18   b) forwarding the message carrying the at least one

19   network path determination constraint to an adjacent

20   downstream node on the partial path, or to a delegated

21   node that is able to carry out the path determination,

22 ~~The method of claim 1~~ wherein each of the at least one

23 network path determination constraint is an executable

24 instruction.

1 Claim 12 (original): The method of claim 11 wherein each

2 executable instruction includes:

3   - information about a first operand;

4   - information about a second operand; and

5   - an operation code.

Claim 13 (original): The method of claim 12 wherein the
operation code identifies an operation selected from a
group of operations consisting of:
- bit-wise AND;
- bit-wise OR;
- bit-wise XOR;
- bit-wise equality;
- bit-wise inversion;
- Boolean AND;
- Boolean OR; and
- Boolean negation.

Claim 14 (original): The method of claim 12 wherein the
information about either of the first operand or the second
operand is a pointer to a register.

Claim 15 (original): The method of claim 14 wherein the
register is a register which contains a link attribute.

Claim 16 (original): The method of claim 14 wherein the
register is a read-only register.

Claim 17 (currently amended): The method of claim 11 1
further comprising:
- generating a list which specifies nodes on the
partial path as strict hop nodes; and
- forwarding the list to an adjacent downstream node
on the partial path.

Claim 18 (original): A method for processing, by a node of
a network, a message carrying at least one network path
determination constraint, the method comprising:

a)   determining whether the node is a tail-end node, a
head-end node, or an intermediate node of the path;

b)   if it is determined that the node is a tail-end
node and each of the at least on network path
determination constraint has been satisfied, then
signaling back to an upstream node of the path that
the path is OK;

c)   if it is determined that the node is one of a
head-end node and an intermediate node, then

    i)   determining whether (a) a strict-hop node is
    specified as a next node of an explicit path
    constraint, (b) a loose-hop node is specified as
    a next node of an explicit path constraint, or
    (c) no node is specified as an explicit path
    constraint,

    ii) if a strict-hop node is specified as a next
    node of an explicit path constraint, then

        A)   applying each of the at least one
        network path determination constraint to an
        appropriate one of a link between the node
        and the strict-hop node, the strict-hop
        node, and the partial path defined,

        B)   if each of the at least one constraint
        is satisfied, then forwarding a message
        carrying the at least one network path
        determination constraint to the strict-hop
        node, and

        C)   if any one of the at least one
        constraint was not satisfied, then signaling
        a path error back to an upstream node,

    iii) if one of (a) a loose hop node is specified
    as a next node of an explicit path constraint or

36   (b) no node is specified as an explicit path

37   constraint, then

38   A)   performing a constraint-based path

39   determination to a next node selected from a

40   group of nodes consisting of

41   (1) an area border node,

42   (2) an autonomous system gateway node,

43   (3) a node that can process one of the

44   at least one network path determination

45   constraint carried by the message which

46   the present node cannot, or is

47   unwilling to, evaluate,

48   (4) a specified loose-hop node, and

49   (5) a node to which constraint

50   processing is delegated,

51   to generate a partial path, and

52   B)   forwarding the message carrying the at

53   least one network path determination

54   constraint to an adjacent downstream

55   node on the partial path.

1   Claim 19 (original): The method of claim 18 wherein the

2   upstream node is the head-end node.

1   Claim 20 (currently amended): A machine-readable medium

2   having stored thereon at least one network path

3   determination constraint expressed as an executable

4   instruction, each executable instruction comprising:

5   -   information concerning a first operand;

6   -   information concerning a second operand; and

7   -   an operation code,

8   wherein the machine-readable medium is a
9   component of a first node of a communications network, and
10   wherein the at least one network path
11   determination constraint expressed as an executable
12   instruction was received in a message from a second node of
13   the communications network.

1   Claim 21 (original): The machine-readable medium of claim
2   20 wherein the operation code denotes an operation selected
3   from a group of operations consisting of:
4   - bit-wise AND;
5   - bit-wise OR;
6   - bit-wise XOR;
7   - bit-wise equality;
8   - bit-wise inversion;
9   - Boolean AND;
10   - Boolean OR; and
11   - Boolean negation.

1   Claim 22 (original): The machine-readable medium of claim
2   20 wherein the information concerning either of the first
3   operand or the second operand is a pointer to a register.

1   Claim 23 (original): The machine-readable medium of claim
2   22 wherein the register is a register that contains a link
3   attribute.

1   Claim 24 (original): The machine-readable medium of claim
2   22 wherein the link attribute is selected from a group of
3   link attributes consisting of:
4   - link type;
5   - maximum link bandwidth;

6   - maximum reservable link bandwidth;

7   - current bandwidth reservation;

8   - current bandwidth usage;

9   - link coloring;

10   - link administrative group;

11   - link delay;

12   - link media type;

13   - optical link wavelength;

14   - optical link minimum signal to noise ratio;

15   - optical link maximum power dispersion;

16   - optical link transmission power; and

17   - optical link receiver sensitivity.

1   Claim 25 (original): The machine-readable medium of claim

2   22 wherein the register is a register that contains a node

3   attribute.

1   Claim 26 (original): The machine-readable medium of claim

2   25 wherein the node attribute is selected from a group of

3   node attributes consisting of:

4   - node type;

5   - minimum node throughput;

6   - node quality of service support; and

7   - node queuing type.

1   Claim 27 (original): The machine-readable medium of claim

2   20 having further stored thereon at least one network path

3   determination constraint as a list of at least one explicit

4   node that is specified to be a part of the network path.

1 Claim 28 (original): The machine-readable medium of claim

2 27 wherein the at least one explicit node is one of a

3 loose-hop node and a strict-hop node.

1 Claim 29 (currently amended): A network node comprising:

2   a) a plurality of registers including attribute

3   registers, the attribute registers storing attributes

4   of links in the network; and

5   b) a machine-readable medium having stored thereon

6   at least one network path determination constraint as

7   an executable instruction, each executable instruction

8   including

9   i) a first operand pointer,

10   ii) a second operand pointer, and

11   iii) an operation code,

12   wherein at least one of the first and second

13   operand pointers points to one of the attribute

14   registers, and

15   wherein the executable instruction was

16   received in a message from another network node.

1 Claim 30 (original): The network node of claim 29 wherein

2 the plurality of registers further includes general purpose

3 registers,

4   wherein each of the attribute registers is a

5 read-only register, and

6   wherein each of the general purpose registers is

7 read/write register.

1 Claim 31 (original): The network node of claim 29 wherein

2 the machine-readable medium also has stored thereon at

3 least one network path determination constraint as a list

13

4   of at least one explicit node that is specified to be a

5   part of the network path.

1   Claim 32 (original): The network node of claim 31 wherein

2   the at least one explicitly specified node is one of a

3   loose-hop node and a strict-hop node.

1   Claim 33 (original): The network node of claim 29 wherein

2   the plurality of registers further include accumulation

3   registers storing cumulative attributes of a path.

1   Claim 34 (currently amended): A machine-readable medium

2   having stored thereon~ a message to be communicated between

3   different network nodes in a communications network, the

4   message comprising:

5   a)   an executable instruction encoding at least one

6   network path determination constraint; and

7   b)   a list of at least one explicit node specified to

8   be a part of the path.

1   Claim 35 (original): The machine-readable medium of claim

2   34 wherein the executable instruction includes:

3   -   information concerning a first operand;

4   -   information concerning a second operand; and

5   -   an operation code.

1   Claim 36 (original): A method for processing, by a node of

2   a network, a message carrying at least one network path

3   determination constraint, the method comprising:

4   a)   if the tail-end node of the path is in a part of

5   the network, the topology of which is not known by the

6   node, then performing a constraint-based path

7   determination to a next node selected from a group of

8   nodes consisting of

9   (i) an area border node, and

10   (ii) an autonomous system gateway node,

11   to generate a partial path; and

12   b)   forwarding the message carrying the at least one

13   network path determination constraint to an adjacent

14   downstream node on the partial path.

1   Claim 37 (currently amended):   A method for processing, by

2   a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

5   a)   if a next node specified in a list of explicit

6   nodes is a loose-hop node, then performing a

7   constraint-based path determination to the next

8   loose-hop node to generate a partial path; and

9   b)   forwarding the message carrying the at least one

10   network path determination constraint to an adjacent

11   downstream node on the partial path,

12   wherein each of the at least one network path

13 determination constraint is an executable instruction.

1   Claim 38 (currently amended):   A method for processing, by

2   a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

5   a)   if the node cannot process any one of the at least

6   one network path determination constraint, performing

7   a constraint-based path determination to a node that

8   can process that one of the at least one network path

15

9   determination constraint, to generate a partial path;

10   and

11   b)   forwarding the message carrying the at least one

12   network path determination constraint to an adjacent

13   downstream node on the partial path,

14   wherein each of the at least one network path

15   determination constraint is an executable instruction.

1   Claim 39 (currently amended):   A method for processing, by

2   a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

5   a)   if constraint processing has been delegated to

6   another network element, performing a constraint-based

7   path determination to the other network element to

8   which constraint processing has been delegated to

9   generate a partial path; and

10   b)   forwarding the message carrying the at least one

11   network path determination constraint to an adjacent

12   downstream node on the partial path,

13   wherein each of the at least one network path

14   determination constraint is an executable instruction.

1   Claim 40 (currently amended):   A network node comprising:

2   a)   a path determination facility for performing a

3   constraint-based path determination to a next node

4   to generate a partial path;

5   b)   a signaling facility for

6   i)   receiving a message carrying at least one

7   network path determination constraint, and

8   ii)   forwarding the message carrying the at

9   least one network path determination constraint

16

10   to an adjacent downstream node on the partial
11   path;
12 ~~The network node of claim 6, further comprising:~~
13   c) a process for generating a traffic engineering
14   database; and
15   d) a traffic engineering database generated by the
16   processing for generating,
17   wherein the path determination facility is further
18   adapted to determine at least a part of a path based
19   on
20   i) contents of the traffic engineering
21   database, and
22   ii) at least one path constraint received from
23   the signaling facility,
24   wherein, if the path determination facility
25 cannot determine a complete constraint-based path to a
26 specified tail-end node, then the path determination
27 facility performs a constraint-based path determination
28 to a next node selected from a group of nodes consisting
29 of
30   - an area border node,
31   - an autonomous system gateway node,
32   - a node that can process one of the at least
33   one network path determination constraint
34   carried by the message which cannot be
35   evaluated by the present node,
36   - a specified loose-hop node, and
37   - a node to which constraint processing is
38 delegated,
39   to generate a partial path, and

40   the signaling facility forwards a message carrying the at

41   least one path constraint to an adjacent downstream node

42   on the partial path.

1   Claim 41 (original): The routing facility of claim 40

2   wherein the path is a label-switched path.

Claims 42-52 (canceled)

1   Claim 53 (currently amended): The method of claim 5,

2   wherein the node is an intermediary node, and wherein the

3   act of performing a constraint-based path determination

4   includes determining whether a link from the node to the

5   next node specified in a ~~the~~ first portion of the path

6   satisfies the set of at least one constraint.

1   Claim 54 (currently amended): A method for processing,

2   by a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

5   a) performing a constraint-based path determination

6   to a next node to generate a partial path;

7   b) forwarding the message carrying the at least one

8   network path determination constraint to an adjacent

9   downstream node on the partial path, wherein the

10   node is an intermediary node, and wherein the act of

11   performing a constraint-based path determination

12   includes determining whether a link from the node to

13   the next node specified in the first portion of the

14   path satisfies the set of at least one constraint;

15   and

16 ~~The method of claim 53, further comprising:~~

17   c) if the link from the first intermediary node to

18   the next node specified in a ~~the~~ first portion of

19   the path is determined to satisfy the set of at

20   least one constraint, then transmitting the received

21   message to the next node.

1   Claim 55 (currently amended): A method for processing,

2   by a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

5   a) performing a constraint-based path determination

6   to a next node to generate a partial path;

7   b) forwarding the message carrying the at least one

8   network path determination constraint to an adjacent

9   downstream node on the partial path, wherein the

10   node is an intermediary node, and wherein the act of

11   performing a constraint-based path determination

12   includes determining whether a link from the node to

13   the next node specified in the first portion of the

14   path satisfies the set of at least one constraint;

15   and

16 ~~The method of claim 53, further comprising:~~

17   c) if the link from the first intermediary node to

18   the next node specified in a ~~the~~ first portion of

19   the path is determined not to satisfy the set of at

20   least one constraint, then transmitting an error

21   message back to the source node.

Claim 56 (canceled)

1   Claim 57 (previously presented): The machine-readable
2   medium of claim 35 wherein first operand specifies a
3   memory location in which a value for an attribute of a
4   network node or link is stored, and the second operand
5   represents a constraint value for the attribute, and
6   further comprising:
7   c) a code specifying an operation to be performed
8   on the first operand and second operand; and
9   d) a result portion specifying a memory location in
10   which a result of the operation performed on the
11   first operand and second operand is stored.

Claims 58 and 59 (canceled)

1   Claim 60 (previously presented): The network node of
2   claim 29, wherein the machine-readable medium further
3   stores thereon a table including
4   i) a first entry representing a first
5   attribute of a node or link connected to the
6   node,
7   ii) a second entry representing an accumulated
8   value for a second attribute of a node or link
9   connected to the node, and
10   iii) a third entry storing a result of a
11   specified operation performed on one of the
12   first entry and the second entry.

20

Claim 61 (previously presented):   The network node of
claim 29, wherein the machine-readable medium further
stores thereon a memory data structure including
        i)   a first portion storing attributes of nodes
        or links in the network,
        ii)   a second portion storing network-path
        constraints, and
        iii)   a third portion storing instructions for
        performing operations on the stored attributes
        and the stored constraints; and further
        comprising:
    c)   a processor for executing the instructions
    stored in the third portion of memory and computing
    a path in the network based on results of the
    executed instructions.

Claim 62 (canceled)

Claim 63 (previously presented):   The network node of
claim 6 wherein if constraint processing has been
delegated to another network element, then the path
determination facility further performs a
constraint-based path determination to the other network
element to which constraint processing has been delegated
to generate a partial path.

Claims 64-69 (canceled)

Claim 70 (original): A method for processing, by a node of a network, a message carrying at least one network path determination constraint, the method comprising:

      a)   determining whether to delegate constraint processing to another device; and

      b)   if it has been determined that constraint processing has been delegated to another network element, forwarding the message carrying the at least one network path determination constraint to the other device.

Claim 71 (new): The method of claim 36 wherein each of the at least one network path determination constraint is an executable instruction.

Claim 72 (new): The method of claim 70 wherein each of the at least one network path determination constraint is an executable instruction.

Claim 73 (new): The method of claim 4 wherein the path is a label-switched path.

Claim 74 (new): The method of claim 4 wherein the message is a resource reservation protocol PATH message.

Claim 75 (new): The method of claim 4 wherein at least one of the at least one network path constraint is an executable instruction.

Claim 76 (new): The method of claim 7 wherein the path is a label-switched path.

1   Claim 77 (new):   The method of claim 7 wherein the message

2   is a resource reservation protocol PATH message.

1   Claim 78 (new):   The method of claim 7 wherein at least one

2   of the at least one network path constraint is an

3   executable instruction.